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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/559,609	12/02/2005	Shinji Eritate	03500.103418.	1529

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EXAMINER	
ECHELMEYER, ALIX ELIZABETH	
ART UNIT	PAPER NUMBER
1729	
MAIL DATE	DELIVERY MODE
03/17/2011	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/559,609	ERITATE ET AL.	
	Examiner	Art Unit	
	Alix Elizabeth Echelmeyer	1729	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 August 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *3-5 and 7-9* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *3-5 and 7-9* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on August 12, 2010 has been entered.

2. Claim 3 is amended. Claims 8 and 9 are added. Claims 3-5 and 7-9 are pending and are rejected for the reasons given below.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 3 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 3 recites the limitation "a surface" in the limitation beginning, “bringing an electrode metal catalyst…” There is insufficient antecedent basis for this limitation in the claim because it is unclear which surface the electrode metal catalyst is brought into contact with. For the purposes of examination, this will be interpreted as being brought into contact with a membrane surface, as suggested by newly added claim 9.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 3, 8, and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koyama et al. (US 2002/0061431) in view of Tsusaka et al. (US 2002/0001744) and Ito et al. (US 2004/0044160), and as evidenced by Kosako et al. (US 2003/0158273).

Regarding claims 3 and 9, Koyama et al. teaches a fuel cell having solid polymer electrolyte membrane containing a sulfonic group (abstract). Koyama et al. teach that a fuel cell assembly is made by forming a catalyst layer, coating it with a layer of electrolyte solution, and then bonding the catalyst layer to the membrane [0061].

Koyama et al. fail to explicitly teach that the precursor layer infiltrates the catalyst layer.

Kosaka et al. teach that when there is direct application of a polymer electrolyte, as occurs in Koyama et al., there results infiltration of the electrolyte into the catalyst layer ([0105]). Based on the teachings of Kosaka et al., the skilled artisan will recognize that, when a layer of electrolyte solution is coated on the catalyst layer, the electrolyte inherently infiltrates the catalyst layer.

Koyama et al. fail to teach that the composition is polymerized.

Tsusaka et al. teach a membrane electrode assembly (MEA) for a solid polymer fuel cell (abstract).Tsusaka et al. teach that the MEA comprises a polymer electrolyte membrane having catalyst layers on either side, wherein the membrane and catalyst layers include a compound having activity to an active energy ray, that infiltrates both the membrane and the catalyst layer (Figure 1; [0025]; [0028]; [0029]).

Tsusaka et al. teach that the MEA is made by bonding the catalyst layer, to the membrane by thermal bonding, or active energy ray ([0064]). The thermal bonding causes polymerization, bonding the layers together ([0067], [0076]-[0078]).

Tsusaka et al. further teach an electrode metal catalyst layer, wherein the catalyst layer is made of a metal, platinum or platinum alloy, supported on carbon ([0072]). This is the same electrode metal catalyst as found in the instant specification (page 9 lines 14-25).

Tsusaka et al. teach that polymerization of the components after assembly leads to better bonding between the catalyst layer and membrane, preventing possible bond failures which can lead to broken conductivity paths ([0022]).

It would have been obvious to one having ordinary skill in the art at the time of the invention to polymerize the electrolyte coating of Koyama et al. after application of the membrane in order to provide a better bond.

With further regard to claims 3 and 9, Koyama et al. in view of Tsusaka et al. fail to teach coating the membrane material on a reinforcing sheet and attaching the membrane to a second electrode catalyst on second electrode.

Ito et al. teach coating, or impregnating, of a polymerizable membrane material on either side of a reinforcing sheet and then irradiating the material to polymerize it, forming a membrane that can be used in a fuel cell ([0001], [0015], [0016]).

Ito et al. teach that substrates may be applied to the coatings on either side of the reinforcing sheet (Figure 1). The skilled artisan, in light of the teachings of Koyama of bonding the membrane directly to the electrodes, would be capable of applying the electrode directly to the membrane of Ito et al. prior to polymerization in order to create an integrated fuel cell.

With regard to claim 8, Ito et al. teach methacroyl oxyethyl phosphate as the membrane material ([0031]).

Ito et al. further teach that the membrane has high electric conductivity and excellent heat and chemical resistance, making it well suited for fuel cells ([0006]).

It would have been obvious to the skilled artisan at the time of the invention to use the method of Ito et al. including coating a reinforcing sheet to reinforce the membrane of Koyama et al. in order to produce a membrane having the desirable characteristics discussed above.

7. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Koyama et al. in view of Tsusaka et al. and Ito et al. as applied to claim 3 above, and in further view of Fuglevand et al. (US 6,218,035).

The teachings of Koyama et al., Tsusaka et al. and Ito et al. as discussed above are incorporated herein.

Koyama et al. in view of Tsusaka et al. and Ito et al. teach a reinforcement member for the membrane ([0062]) but fail to teach that the reinforcement member is an electrical insulator.

The reinforcement member of Koyama et al. in view of Tsusaka et al. and Ito et al. is part of the catalyst layer, so it is provided on the catalyst layer.

Koyama et al. in view of Tsusaka et al. and Ito et al. further teach an electrode metal catalyst layer, wherein the catalyst layer is made of a metal, platinum or platinum alloy, supported on carbon ([0072]). This is the same electrode metal catalyst as found in the instant specification (page 9 lines 14-25).

Fuglevand et al. teach a support matrix, or reinforcement member, for use in their solid polymer proton exchange membrane fuel cell (column 19 lines 39-40). Grafted polyethylene is provided as an example of the reinforcement member (column 19 lines 59-61). The instant specification discloses ethylene as a suitable material for the reinforcement layer ([0063]).

It would be desirable to use a non-conductive reinforcement member, such as the one of Fuglevand et al., in the membrane of Koyama et al. in view of Tsusaka et al.

and Ito et al. since a non-conductive reinforcement member would provide support without interfering with the electronic operation of the fuel cell.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use a non-conductive reinforcement member, such as the one of Fuglevand et al., in the membrane of Koyama et al. in view of Tsusaka et al. and Ito et al. since a non-conductive reinforcement member would provide support without interfering with the electronic operation of the fuel cell.

8. Claims 4 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koyama et al. in view of Tsusaka et al. and Ito et al. as applied to claim 3 above, and further in view of Akita et al. (US 6,523,699).

The teachings of Koyama et al., Tsusaka et al. and Ito et al. as discussed above are incorporated herein.

With regard to claim 4, Koyama et al. in view of Tsusaka et al. and Ito et al. further teach an electrode metal catalyst layer, wherein the catalyst layer is made of a metal, platinum or platinum alloy, supported on carbon ([0072]). This is the same electrode metal catalyst as found in the instant specification (page 9 lines 14-25).

Koyama et al. in view of Tsusaka et al. and Ito et al. fail to teach the thickness of the catalyst and electrode layers, only that the layers are desired to be thin ([0011]; [0027]).

Akita et al. teach a fuel cell having excellent catalytic activity (abstract).

Akita et al. further teach that the platinum catalyst should be 50-250 μm thick. According to Akita et al., for catalyst thicknesses less than 50 μm, there could be an insufficient amount of catalyst, and for thicknesses greater than 250 μm, the possibility of the catalyst surface becoming unstable arises (column 8 lines 31-44).

As for the limitation concerning the depth of infiltration into the electrode catalyst layer, the infiltration would necessarily be equal to or less then the thickness of the electrode catalyst layer, since it would be impossible for the membrane to infiltrate the electrode catalyst layer further than the thickness of the layer. Additionally, since the MEA of Tsusaka et al. is made by the same method of the instant invention, the infiltration depth would inherently meet this limitation.

It would be desirable to make the platinum catalyst of Koyama et al. in view of Tsusaka et al. and Ito et al. 50-250 μm thick, encompassing most of the claimed range, since at smaller thicknesses, there could be an insufficient amount of catalyst, while at larger thicknesses, the catalyst surface could become unstable.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to make the platinum catalyst of Koyama et al. in view of Tsusaka et al. and Ito et al.50-250 μm thick, since at smaller thicknesses, there could be an insufficient amount of catalyst, while at larger thicknesses, the catalyst surface could become unstable.

Response to Arguments

9. Applicant's arguments filed August 12, 2010 have been fully considered but they are not persuasive.

Applicant argues, at the top of page 7, that Koyama et al. do not disclose "a process in which an electrode metal catalyst fixed to another electrode is brought into contact with a surface of the electrode metal catalyst layer, which is coated with an electrolyte membrane precursor solution…" This limitation is not found in the claims as filed.

As for Applicant's arguments concerning Tsusaka et al., the examiner is not convinced. The Tsusaka reference is relied upon for the teaching of bonding by polymerization, not the entire method of forming the membrane electrode assembly. The coating step is taught by Koyama et al. Applicant is reminded that one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alix Elizabeth Echelmeyer whose telephone number is (571)272-1101. The examiner can normally be reached on Mon-Fri 7-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ula Ruddock can be reached on 571-272-1481. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Ula C Ruddock/
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